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The Institute Spokesman

NATIONAL LUBRICATING GREASE INSTITUTE

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Air Cleaners

CONSTRUCTION — HOW THEY FUNCTION — SERVICING INSTRUCTIONS

By SUMNER S. HOWARD, *Service Manager*
AC Spark Plug Division of General Motors, Flint, Michigan

Every car and truck is now originally equipped with an air cleaner. The purpose of the air cleaner is to keep dust, grit and other foreign matter from being sucked into the engine through the carburetor.

An efficient air cleaner improves engine performance. It also adds life to pistons, cylinders, piston rings and bearings, thereby saving the motorist many dollars. Under severe dust conditions an engine would be worn out and completely ruined in less than a week's operation if it were not equipped with an efficient air cleaner.

Today there must be in the neighborhood of 30 million air cleaners in use on motor vehicles. Yet, in spite of its vital importance, the air cleaner is neglected by some service men—and when an air cleaner is neglected it means that the car owner is not getting the benefit of this protective device placed on his car by the manufacturer.

It is the responsibility of every service man to suggest air cleaner servicing to owners, and to acquaint these owners with the importance of this device and the vital necessity of keeping it in proper condition.

Few things will gain so much Goodwill for a dealer, a repairman or a service station attendant as informing his customer about air cleaner service. Besides the goodwill to be had, there is a nice profit to be made. The service charge is not large, but the volume will easily make air cleaner business most desirable. After all, a thriving service business is built upon worth while service to the customer.

Air cleaners today have reached a high degree of development and efficiency. The very latest air cleaner developed, which is used on all 1937, 1938 and 1939 cars, is called the "Removable Element Type." This type cleaner will probably be used for many years because it is easy to remove the filtering element, discard it, and install a new pre-oiled, high efficiency element.

When the dirty filtering element is removed and discarded, and a new one inserted, the cost is no greater than that for servicing the previous types. The filtering elements used for replacement purposes in the new cleaners are pre-oiled, enclosed in an oil-proof wrapper, and attractively packaged.

Previously, air cleaners were so designed that the entire assembly had to be removed for cleaning and re-oiling. This discouraged proper attention to the air cleaner, which requires thorough cleaning. When not cleaned, higher gasoline consumption will result and cleaner efficiency will be reduced greatly.

The air cleaner used on a particular car is calibrated with the carburetor setting on that same car. This makes it vitally important when making a replacement to use the proper type filtering element, similar to the original.

For highest efficiency, the air cleaner must be serviced every 2,500 miles under normal driving conditions, and oftener in extremely dusty territories.

Years ago when air cleaners were first introduced, all of them were of a design that needed no cleaning or attention during the life of the car. Present day cleaners, however, are much higher in efficiency, are of improved design, and must either be cleaned periodically or, as in the case of 1937, 1938 and 1939 cars, have new filtering elements installed periodically.

Most air cleaners are built in combination with carburetor intake silencers. In some cases the cleaner can be detached from the silencer, but in other cases it cannot.

The cleaner element is composed of a dense mass of flat copper wire woven into a mesh, which is saturated with oil. The dirt and dust in the intake air adhere to these oily surfaces and only clean air enters the engine.

In addition to the carburetor, another point at which much abrasive dust may enter an engine is through the crankcase breather tube. On modern engines having crankcase ventilation, much air is actually sucked into the crankcase through this pipe. A crankcase breather cleaner prevents harmful dust from entering the crankcase through the breather tube. This cleaner should also be cleaned every 2,000 miles or oftener.

The following procedure for cleaning, re-oiling and servicing various types of air cleaners is recommended:

COMBINATION AIR CLEANER AND SILENCER

1. *Integral Type* (one-piece)

In this combination, the air cleaner is an integral part of the silencer. Remove the entire assembly from the carburetor and wash the accumulated dirt from the cleaner element by plunging it up and down several times in a can of gasoline or kerosene. Then re-oil the cleaner element by dipping it in heavy cylinder oil (SAE 50), letting excess oil drain off. Reassemble to the carburetor in original position. *(Continued on page 4)*

Technical Data

CLASSIFICATION, COMPOSITION AND USES OF GREASES

(Continued from last issue)

Classification	Class Name	COMPOSITION			Remarks and Recommendations
		Alkali	Fats	Mineral Oil	
According to Commercial Uses	Cup greases.	Usually calcium hydroxide.	Same as for lime-base greases.	Same as for lime-base greases.	Usually lime-base greases contain 80 to 90 percent mineral oil and 10 to 20 percent saponified fat. Water generally present from traces up to 1 percent. Melting point varies from 120 to 200° F., depending on the soap content. General purpose greases used in a wide variety of services, but are not suitable for high speeds and temperatures above 175° F. These are water repellent greases.
	Graphite greases.	Calcium hydroxide.	Same as for lime-base greases.	Same as for lime-base greases.	Usually cup greases to which has been added from 2 to 20 percent flaked, powdered or colloidal graphite. Especially suitable where the lubricant is likely to be washed away by water, oil or chemical solvents. Hydraulic rams, plungers, slides and bearings exposed to water, elevator cables and slides are typical examples where these greases are used. Not suitable for ball and roller bearings unless graphite is in colloidal form. Obtainable in five consistencies.
	Fibre and sponge greases.	Sodium hydroxide.	Same as for lime-base greases.	Same as for lime-base greases.	Called fibre or sponge greases because of their peculiar fibrous or granular structure. Melting point varies from 200 to 400° F. Cannot be used in the presence of water as they readily emulsify and are easily washed from the bearing surfaces. If of good quality can be melted and cooled again without altering their consistency. Contain no filler of any kind. Especially suitable for ball and roller bearings, automobile wheel bearings, universal joints, spring shackles, steering gears, etc. Obtainable in five consistencies.
	Ball and roller bearing greases.	Calcium, sodium and aluminum hydroxide and lead oleate, as well as various mixed alkalies.	Same as for lime-base greases.	Generally high-grade lubricating oils.	Soft greases, composed of petroleum jelly, or mixtures of this with mineral oils; or soft cup greases containing 12 to 15 percent soap and mineral oil having a viscosity of 400 to 500 sec. Saybolt at 100° F.; or sodium base grease containing 16 to 20 percent soap and mineral oil having a viscosity of 500 to 600 sec. Saybolt at 100° F.; or aluminum soap greases and mixed base greases of lime and sodium. Generally lime-base greases are not recommended where temperatures are above 150° F. Greases are not generally recommended for these bearings where temperatures exceed 200° F. and speeds over 10,000 r.p.m. Essential features of these greases are that they are practically free of moisture, neutral and contain no filler other than colloidal graphite.
	Axle greases.	Calcium hydroxide.	Generally rosin acid.	Various lubricating oils.	Usually made from lime and rosin oil, with or without addition of mineral oils. Lime combines with rosin acid, forming soap which thickens the oil. Usually more lime used than necessary to combine with rosin acid, excess remaining as filler. Mica, talc, soapstone, etc., frequently used as fillers. Suitable for rough service, such as cast-iron bearings of farm machinery, etc.
	Gear greases.	Sodium, calcium, aluminum hydroxide or none.	Same as for lime-base greases or none.	Various lubricating oils; residuum oils; and cylinder stocks.	Gear greases may be residuum, lime-, sodium-, or rosin-base. Frequently contain dark cylinder oil as a softening ingredient, usually possess strong adhesive properties and capable of absorbing shock loads. Outside gear greases usually are heavy, viscous residuum grease which requires heating before applying. Made in a wide variety of consistencies.
	Wool and yarn greases.	Generally calcium hydroxide or none.	Same as for lime-base greases or none.	Same as for lime-base greases.	May be cup, sponge or residuum greases containing strands of wool, cotton yarn or horse hair. When the latter is used the grease is generally termed "elastic wool yarn grease." Used for lubricating journal bearings fed through packed or open boxes, such as crane, mine car and certain types of heavy-duty electric-motor bearings.
	Mine-car greases.	Calcium and sodium hydroxides.	Same as for lime-base greases.	Various lubricating oils.	These greases are usually cup, sponge or fibre greases used for lubricating plain and anti-friction bearings of mine cars and motors. Usually obtainable in four consistencies.
	Wire-rope greases.	Calcium hydroxide or none.	Generally rosin acid or none.	Heavy residuum oils and various lubricating oils.	Generally cheap either of the rosin-base or residuum type. Generally very heavy, sticky and adhesive. Usually non-fluid at ordinary temperatures and applied hot by means of brush or swab. Obtainable in five or more consistencies. See Federal Specifications, page 75.
	Hydraulic greases.	Calcium hydroxide, zinc alkalies or none.	Same as for lime-base greases or none.	Residuum oils, dark lubricating oils and cylinder stocks.	Usually lime-base, zinc-base, or residuum greases. Usually dark, viscous products extremely adhesive and resistant to the washing action of water. Suitable for plunger pole lubricants in mines where water is present. Obtainable in five consistencies.
	Block or brick greases.	Sodium hydroxide.	Same as for lime-base greases.	Dark lubricating oils and cylinder stocks.	A very hard grease having a melting point as high as 450° F. Often supplied in blocks or bricks shaped to fit open cavities of high-temperature bearings of cement, paper and tube mills, laundries, coolers, locomotives, etc. Considerable clearance should be allowed between the "brick" and cavity to prevent "bridging" of the grease. Usually obtainable in three or four consistencies.
	Cold and hot neck greases.	Sodium or calcium hydroxide or none.	Same as for lime-base greases.	Dark lubricating and residuum oils and cylinder stocks.	May be block sodium or calcium-base greases made with heavy dark lubricating oils or residuum oils. Frequently contain graphite. Used for lubricating the roll necks of steel mill stands having plain bearings requiring a block grease. Obtainable in four or more consistencies packed in 440 lb. bbl. or 90 lb. boxes.
	Calender greases.	Sodium hydroxide.	Same as for lime-base greases.	Dark lubricating oils and cylinder stocks.	High-melting-point soda-base greases, similar to block greases. Sometimes packed in canvas bags to apply as pads to calender-roll bearings.
	Launching greases.	Generally none.	Generally mixed fats.	Cheap dark lubricating oils or cheap cylinder stocks.	Tallow substitutes, composed of mixed fats and possibly some soap, are cheap, and not suitable for lubricating bearings.
	Anti-rust, rust preventives, or slushing greases.	Generally none.	Generally none.	Light and heavy bodied lubricating oils.	Seldom do these so-called greases contain a soap thickner. In general they are pure mineral oil, or mixtures of cylinder stock and petrolatum. The former type is commonly used to rust-proof razor blades, needles, hand tools, and instruments, while the latter type is used to provide a protective coating for machine tools, engines, etc., while in storage or transportation.

* Virginia Polytechnic Institute.

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CORRECTION

The following addition should be made to the "Committee Line-up" as listed in the December issue of the Institute Spokesman. Members representing the Association in the A. S. T. M., Committee D-2, M. B. Chittick, Pure Oil Co.

Sydney Bevin—Fiske Bros. Refining Co. Technical Committee.

CAR MANUFACTURER'S RECOMMENDATIONS

OLDS AUTOMATIC SAFETY TRANSMISSION

There seems to be some misunderstanding regarding the capacity of the Automatic Safety Transmission which Oldsmobile offers as optional equipment. The capacity of 7 pt. as given on the chassis lubrication diagram published by Oldsmobile, is correct where the oil pan is removed and the unit is completely drained.

However, due to the drain plug not being located at the lowest point in the pan, approximately 1 pt. remains in the case when drained and the refill capacity when pan is not removed is therefore 6 pt.

INHIBITED ANTI-FREEZE

Just a word at this time about the addition of rust inhibitors to anti-freeze. Practically all well-known brands of anti-freeze solutions already contain a rust inhibitor and, therefore, it is not necessary to add any more. In fact, more than the proper amount of rust inhibitor in the cooling system may be detrimental.

1939 CAR MODELS

BUICK. One thing that the service man will have to be on the lookout for is the new center bearing on the propeller shaft. This is mounted to the frame and, while suspended in rubber, has a lubrication point at the joint. This appears on the 40 and 60 models. The automatic transmission, carried as optional on the 40 in 1938, has been discontinued.

CADILLAC. Wax-lined springs are continued.

CHEVROLET. The De Luxe model uses the new Double A frame type of knee action, which replaces the Dubonnet combined spring and shock absorber used on previous models. Hypoid gears are retained.

CHRYSLER. Transmission over-drive is standard for C-24 and optional on C-22 and C-23 models.

DODGE. Independently-sprung front wheels in 1939 models.

FORD. Hydraulic brakes are a feature of the 1939 line.

LA SALLE. Rubber has been used in a good many places, eliminating previous lubrication points. Extreme care needs to be taken with lubrication of some of the engine accessories, such as the starter, which are somewhat inaccessible from above.

LINCOLN ZEPHYR. Has hydraulic brakes and uses expanders under the two lower piston rings.

OLDSMOBILE. Coil rear springs, previously found only in the Buick, are used. There are a number of other design changes, including layout of the steering parts.

PACKARD. Has a fifth shock absorber on the rear equalizer bar—the first time this has been used in American automobile practice. Transmission overdrive being used for the first time as optional equipment on all models except the Twelve.

PLYMOUTH. Both models have new-type independently suspended front wheels, a new departure for the Plymouth.

PONTIAC. Has hypoid gears for the first time and the new-type variable-rate rear spring.

STUDEBAKER. The Planar front suspension is continued, but with a number of changes in the location and number of lubrication points.

According to Commercial Uses

Classification	Class Name	COMPOSITION			Remarks and Recommendations
		Alkali	Fats	Mineral Oil	
	Curve and track greases.	Calcium hydroxide or none.	Rosin acid.	Usually heavy, dark cylinder stock blended with a lighter body neutral oil.	Generally made by the cold set process. Similar to cheap axle and launching greases; sometimes contain graphite or other fillers. Used for lubricating car tracks on curves, skids, etc. Obtainable in summer and winter consistencies.
	Locomotive driving-box and rod-pin greases.	Usually sodium hydroxide, but sometimes calcium hydroxide.	Generally tallow or palm oil.	Heavy lubricating oils and cylinder stocks.	Both of these greases are exceedingly hard. Driving-box grease usually has a melting point above 400° F. while that of the rod-pin grease is about 360° F. In general there are three types of these greases: (1) the so-called sett type made cold by the reaction of caustic soda with fat in the presence of heavy cylinder stock; (2) the fibrous soda-soap type, which is only partially dehydrated; (3) the completely dehydrated and melted soda-soap type. See Federal Specifications, pp. 74 and 75.
	Automobile chassis greases:				
	Wheel-bearing grease.	Calcium and sodium hydroxide.	Same as for lime-base greases.	Various lubricating oils.	Most automobile and bearing manufacturers recommend a short-fiber soda-base grease containing a mineral oil of not less than 300 sec. Saybolt viscosity at 100° F. for wheel bearings. In the past cup greases have been extensively used for this purpose. See typical specifications of this type of grease on page 76.
	Universal-joint grease.	Sodium hydroxide.	Same as for lime-base greases.	Various lubricating oils.	To effectively lubricate the universal joint a grease must have strong adhesive and cohesive properties, as the high centrifugal force tends to pull the grease out of the joint. Usually the best grease for this service is a long-fiber soda-base type. See page 77 for typical specifications.
	Steering-gear grease.	Calcium, sodium and aluminum hydroxide.	Same as for lime-base greases.	Various lubricating oils.	Many grease companies do not market a special grease for this service, but recommend regular gear greases or pressure-gun greases. These products render fairly satisfactory service if the housing is tight enough to hold such fluid greases. Steering-gear greases usually contain 5 to 6 percent of calcium soap and a very heavy bodied lubricating oil. Extreme pressure compounds are also frequently added.
	Water-pump grease.	Calcium hydroxide.	Same as for lime-base greases.	Various lubricating oils.	Usually this is a hard calcium-soap grease containing 20 to 25 percent soap and having a melting point above 200° F. See page 77 for typical specifications.
	Pressure-gun grease.	Calcium, sodium and aluminum hydroxide.	Same as for lime-base greases.	Various lubricating oils.	These greases are primarily intended for the lubrication of spring shackles of automobiles. They are frequently used for other purposes where application is by means of a pressure gun. Typical specifications of these greases are given on page 76.

(Continued from page 1)

Note: A hair-felt pad is assembled in some of these silencers to remove carburetor hiss. Care should be taken that this pad is NOT dipped in gasoline or oil during the cleaning operation.

2. *Detachable Type*

In this type, the cleaner element can be detached, usually without disturbing the rest of the assembly. Wash the accumulated dirt from the cleaner element by plunging it up and down several times in a can of gasoline or kerosene. Then re-oil the cleaning element by dipping it in heavy cylinder oil (SAE 50), letting excess oil drain off. Reassemble to the cleaner in original position.

3. *Semi-Detachable Type*

In this type, the cleaner element is integral with the silencer, but the hair-felt pad is detachable. Always remove this pad before cleaning and re-oiling the element. Wash the accumulated dirt from the cleaner element by plunging it up and down several times in a can of gasoline or kerosene. Then re-oil the cleaning element by dipping it in heavy cylinder oil (SAE 50), letting excess oil drain off. Replace the felt pad in position and place the entire assembly in original position.

4. *Removable Filtering Element Type* (used on practically all 1937, 1938 and 1939 cars and most trucks and buses).

Remove wing nut. Lift off cover plate. Remove and discard dirty element. Insert new element. Re-assemble cover plate and wing nut.

5. *AC Heavy Duty* (Oil Bath) *Type*

For buses and trucks (especially on construction work) or other engines used in alkali or extremely dusty territory, the heavy duty air cleaner is highly important in saving repair expense and in prolonging engine life. It is simple in construction, easy to install, easy to service.

This construction is made both as an air cleaner and as a combination air cleaner and silencer. It is quickly interchangeable with the silencer and air cleaner installed on the carburetor as standard equipment and will not affect the power and economy in any way.

In operation, dusty air enters the cleaner through opening (A) between shell and top cover, passing downward through annular passage (B). The air strikes shelf (C) throwing heavier dust particles into the oil and reverses upward into filter element (D). Oil is carried upward into the filter element in a predetermined amount which automatically oils and washes it. Dirt not directly precipitated into the oil is caught on the filter element and washed back into oil sump (E). Cleaned air passes out of the filter element to the carburetor through passage-way (F). A perforated baffle (G) prevents oil pullover on large engines.

The periods for cleaning and re-oiling this type of air cleaner will vary according to the particular conditions under which the engine is operating. To service, remove the upper cover and lift out the filter element. Wash this in gasoline or kerosene. Empty the old oil out of the sump or base of the cleaner, scrape out the accumulated mud and wash out the base with gasoline. Fill the base with fresh oil (SAE 50) to indicated level (about 1 pt. required). Do NOT re-oil the filter element as it is oiled automatically in operation from the oil supply in the sump. Re-assemble element and top cover, then replace complete assembly on the carburetor securely.

Editor's Note: This article by Mr. Howard definitely brings out the necessity of correctly servicing air cleaners. The servicing instructions given will, in general, apply to all makes of air cleaners, as all function in a similar manner. Some makes and types of oil bath cleaners, however, have a larger oil capacity, particularly for use on trucks used in excavating or other extremely dusty operations.

Intervals for servicing air cleaners, as recommended by various automobile manufacturers, vary all the way from every 1,000 to 5,000 miles. The majority of manufacturers usually state that the frequency of servicing depends upon operating conditions. During severe dust storms encountered in some sections of the country, it has been found necessary to service air cleaners daily. Therefore, definite mileage intervals should not be established.

Car manufacturers also are not in accord as to the grades of oil to be used for servicing heavy duty, or oil bath type, air cleaners. In general, however, the practice is to use a lighter grade in winter.

Air cleaners of the horizontal, instead of the vertical type are used on some cars and trucks where lack of room under the hood prevents the use of the vertical design. While the disassembling of horizontal types is somewhat different than for the vertical types, they function in the same manner.

Sales and Merchandising

47 SELLING FAIRY TALES AND EFFECTIVE ANSWERS TO FAMILIAR ALIBIS

By HARRY SIMMONS, Eastern Sales Manager, The Heinn Company

1. The prospect who says he "doesn't think he wants any today." If he only "thinks" he doesn't want any, maybe he just needs to be sold a little harder; and if not "today" why not some day real soon?

2. The salesman who says: "That territory is all washed up." Oh yeah! The chances are a new man would go in there and develop a lot of new customers that have been passed up.

3. The Purchasing Agent who says: "I can get the same stuff at a lower price." Sure he can, but, at a lower quality, too. Which does he want, price or quality?

4. The salesman who says: "There's no use my making any calls on Saturday; everybody is busy." Maybe your competitor acts the same way, which leaves the field entirely clear to you!

5. The P. A. who says: "Oh, my regular source of supply gives me everything you've got." Is zat so? Ever go back at him with a particular item and say: "HERE is something you can't get elsewhere; and I have others, too."

6. The customer who says: "I don't think your advertising is doing me any good." Just stop the advertising for a little while and listen to the howls you'll get from him!

7. The salesman who says: "I can't call on these fellows too early; I gotta give 'em time to get their mail out of the way." Did you ever hear the one about the "early bird who catches the worm?" And it's no fairy tale, either!

8. The P. A. who says he will "tell your story to the executive upstairs." That's what HE thinks; but can he do justice to his executive, to his company, to himself and to you; can he relay your story accurately and properly?

(To be continued next issue)

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